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EXAMINER	
FANG, PAKEE	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/578,786	SMITH ET AL.	
	Examiner	Art Unit	
	PAKEE FANG	4146	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05/09/2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 – 19, 22 – 31, & 33 - 36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 – 19, 22 – 31, & 33 - 36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05/09/2006* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☒ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *02/16/2007, 05/15/2007, & 07/02/2007*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. **Claims 1 – 20, 22 – 31, & 33 - 36 are presented for examination. Claims 21 and 32 have been canceled by the preliminary amendment filed on 5/9/2006.**

Priority

2. Acknowledgment is made of applicant's claim for foreign priority based on an application filed on 04/20/2006. It is noted, however, that applicant has not filed a certified copy of the original application as required by 35 U.S.C. 119(b). Also, examiner has acknowledged that Petition to add "Claim of Priority Under 35 USC 120 and 37 C.F. R. 1.78(a)(3) filed 23 March 2007 has been Dismissed and mailed on 11/16/2007.

Information Disclosure Statement

3. The information disclosure statements (IDS) submitted on 02/16/2007, 05/15/2007, & 07/02/2007 are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Drawings

4. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, an "*first factor matrix" and "second factor matrix", "a third factor matrix", "subframe" & "first and second weights"* must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

Content of Specification

(a) Title of the Invention: See 37 CFR 1.72(a) and MPEP § 606. The title of the invention should be placed at the top of the first page of the specification unless the title is provided in an application data sheet. The title of the invention should be brief but technically accurate and

descriptive, preferably from two to seven words may not contain more than 500 characters.

(b) Cross-References to Related Applications: See 37 CFR 1.78 and MPEP § 201.11.

(c) Statement Regarding Federally Sponsored Research and Development: See MPEP § 310.

(d) The Names Of The Parties To A Joint Research Agreement: See 37 CFR 1.71(g).

(e) Incorporation-By-Reference Of Material Submitted On a Compact Disc: The specification is required to include an incorporation-by-reference of electronic documents that are to become part of the permanent United States Patent and Trademark Office records in the file of a patent application. See 37 CFR 1.52(e) and MPEP § 608.05. Computer program listings (37 CFR 1.96(c)), "Sequence Listings" (37 CFR 1.821(c)), and tables having more than 50 pages of text were permitted as electronic documents on compact discs beginning on September 8, 2000.

(f) Background of the Invention: See MPEP § 608.01(c). The specification should set forth the Background of the Invention in two parts:

(1) Field of the Invention: A statement of the field of art to which the invention pertains. This statement may include a paraphrasing of the applicable U.S. patent classification definitions of the subject

matter of the claimed invention. This item may also be titled "Technical Field."

(2) Description of the Related Art including information disclosed under 37 CFR 1.97 and 37 CFR 1.98: A description of the related art known to the applicant and including, if applicable, references to specific related art and problems involved in the prior art which are solved by the applicant's invention. This item may also be titled "Background Art."

(g) Brief Summary of the Invention: See MPEP § 608.01(d). A brief summary or general statement of the invention as set forth in 37 CFR 1.73. The summary is separate and distinct from the abstract and is directed toward the invention rather than the disclosure as a whole. The summary may point out the advantages of the invention or how it solves problems previously existent in the prior art (and preferably indicated in the Background of the Invention). In chemical cases it should point out in general terms the utility of the invention. If possible, the nature and gist of the invention or the inventive concept should be set forth. Objects of the invention should be treated briefly and only to the extent that they contribute to an understanding of the invention.

(h) Brief Description of the Several Views of the Drawing(s): See MPEP § 608.01(f). A reference to and brief description of the drawing(s) as set forth in 37 CFR 1.74.

(i) Detailed Description of the Invention: See MPEP § 608.01(g). A description of the preferred embodiment(s) of the invention as required in 37 CFR 1.71. The description should be as short and specific as is necessary to describe the invention adequately and accurately. Where elements or groups of elements, compounds, and processes, which are conventional and generally widely known in the field of the invention described and their exact nature or type is not necessary for an understanding and use of the invention by a person skilled in the art, they should not be described in detail. However, where particularly complicated subject matter is involved or where the elements, compounds, or processes may not be commonly or widely known in the field, the specification should refer to another patent or readily available publication which adequately describes the subject matter.

(j) Claim or Claims: See 37 CFR 1.75 and MPEP § 608.01(m). The claim or claims must commence on separate sheet or electronic page (37 CFR 1.52(b)(3)). Where a claim sets forth a plurality of elements or steps, each element or step of the claim should be separated by a line indentation. There may be plural indentations to further segregate subcombinations or related steps. See 37 CFR 1.75 and MPEP § 608.01(i)-(p).

(k) Abstract of the Disclosure: See MPEP § 608.01(f). A brief narrative of the disclosure as a whole in a single paragraph of 150 words or less commencing on a separate sheet following the claims. In an international

application which has entered the national stage (37 CFR 1.491(b)), the applicant need not submit an abstract commencing on a separate sheet if an abstract was published with the international application under PCT Article 21. The abstract that appears on the cover page of the pamphlet published by the International Bureau (IB) of the World Intellectual Property Organization (WIPO) is the abstract that will be used by the USPTO. See MPEP § 1893.03(e).

(l) Sequence Listing, See 37 CFR 1.821-1.825 and MPEP §§ 2421-2431. The requirement for a sequence listing applies to all sequences disclosed in a given application, whether the sequences are claimed or not. See MPEP § 2421.02.

5. The specification of the disclosure is objected to because the specification lacks section headings for the content of specification as illustrated above. Correction is required. See MPEP § 608.01(b).

6. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The

abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

The abstract of the disclosure is objected to because the abstract repeats information given in the title and include terms such as “said”. Correction is required. See MPEP § 608.01(b).

7. The disclosure is objected to because of the following informalities: the applicant fails to differentiate the term “frame" and “subframe” and fails to provide structural relations or difference of the two terminologies. For the purpose of this examination, the examiner will treat “frame” and “subframe” interchangeably. Appropriate correction is required.

8. The disclosure is objected to because of the following informalities: the applicant fails to define the diagonal matrix or Y matrix. On Page 20 of the specification as "Format Y as a diagonal matrix”, but on Page 19 of the spec. the Y matrix is clearly a single column matrix. For the purpose of this examination, the examiner will treat the diagonal matrix as the same as a column matrix.

9. The disclosure is objected to because it contains an embedded hyperlink and/or other form of browser-executable code on page 24 of the specification. Applicant is

required to delete the embedded hyperlink and/or other form of browser-executable code. See MPEP § 608.01.

Claim Objections

10. Claims 1, 22, 23, are objected to because of the following informalities: Missing “a” in front of "first” and missing “a” in front of “second matrices”. Appropriate correction is required.

Claim Rejections - 35 USC § 112

11. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

12. Claim 27 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. "more than one subframe drives a said pixel data".

13. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-20, 23, 27, 30, 35 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

14. Claim 17 recites the limitation "first and second weights". There is insufficient antecedent basis for this limitation in the claim.

15. Claims 15 & 30 recite the limitation "mxn; mxp; pxn; I; W; & H;" fails to expressively define the selected terms in the claim language. There is insufficient antecedent basis for this limitation in the claim.

16. Claim 27 recites the limitation "more than one subframe drives a said pixel data". There is insufficient antecedent basis in the specification for this limitation in the claim.

17. Claim 23, 30, 35 recites the limitation "said first and second factor matrices". There is insufficient antecedent basis in the specification for this limitation in the claim.

18. Claims 1 – 20 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: "*first factor matrix" and "second factor matrix", "a third factor matrix", "subframe" & "first and second weights"*.

Claim Rejections - 35 USC § 101

19. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 22 & 33 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The preamble recites "A carrier carrying processor control code". As describe on the specification the carrier can be an “electrical signal carrier”. Therefore, the claimed “carrier” is clearly not a "process" under 35 U.S.C. 101 because it is not a series of steps. The claimed “carrier” has no physical structure, does not itself perform any useful, concrete and tangible result and, thus, does not fit within the definition of a machine. A claimed “carrier” is not matter, but a form of “data structure” or “computer language instructions”, and therefore is not a composition of matter. And lastly, because a “carrier” lacks physical substance and is not a residual class of product, a claimed signal does not fall within the definitions of manufacture. Therefore, a claimed signal does not constitute patentable subject matter as set forth in 35 U.S.C. 101. As such, the claim is not limited to statutory subject matter and is therefore non-statutory.

In view of the below sited MPEP section the claims are non-statutory because they are functional descriptive material per se.

MPEP 2106.01 [R-5]
Descriptive material can be characterized as either

"functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) Both types of "descriptive material" are nonstatutory when claimed as descriptive material per se, 33 F.3d at 1360, 31 USPQ2d at 1759.

Claim Rejections - 35 USC § 102

20. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 – 2, 7, 19 -20, 22, 23, 35 are rejected under 35 U.S.C. 102(b) as being unpatentable over Routley. (GBP 85906)

In regard to claim 1, a method of driving an electro-optic display, See at least (Routley; Fig. 5) – "This invention generally relates to display driver circuits for electro-optic displays, and more particularly relates to circuits and methods for driving organic light emitting diode displays…" [0001]

the display having a plurality of pixels each addressable by a row electrode and a column electrode, the method comprising; See at least (Routley; Fig. 5) – for plurality of pixels (item 312 each are addressable by row and column electrode (item 306 and 310) "a plurality n of row lines 304 each with a corresponding row electrode contact 306 and a plurality m of column lines 308 with a corresponding plurality of column electrode contacts 310." [0015]

receiving image data for display, said image data defining an image matrix; See at least (Routley; Fig. 5) – for matrix display (item 302) receives image data to be displayed. "A two-dimensional image may be presented on display 302 by selecting each row in turn and driving all the pixels…" [0058] and the matrix display (item 302) will display the image. "control inputs 509 and 511 to display this data on passive matrix display 302" [0062]

factorising said image matrix into a product of at least first and second factor matrices, See at least (Routley; Fig. 2 & 5) – for a passive matrix displays images receive an

output or a product from the rows and columns of the matrices of the pixels (Item 152). Note: a passive matrix (b x a) always compile of a (b x n) row matrix and a (n X a) column matrix (n being an integer greater than 1). “Organic LEDs may be deposited on a substrate in a matrix of pixels to form a single or multi-colour pixellated display.” & “In such displays the individual elements are generally addressed by activating row (or column) lines to select the pixels, and rows or columns of pixels are written to, to create a display.” [0005] Therefore, the limitation is inherent within the disclosure.

said first factor matrix defining row drive signals for said display, said second factor matrix defining column drive signals for said display; See at least (Routley; Fig. 3 & 5) – for a similar function and setup of row and column matrices defining drive commands for said display. “…a generic driver circuit for a passive matrix OLED display” & “A y -driver 314 drives the column lines 308 with a constant current and an x-driver 316 drives the row lines 304, selectively connecting the row lines to ground.” [0015]

and driving said display row and column electrodes using said row and column drive signals respectively defined by said first and second factor matrices. See at least (Routley; Fig. 3 & 5) – for a similar function and setup of row and column matrices defining drive commands use by the row and column electrodes. *“…*row electrodes 306 driven by row driver circuits 512 and column electrodes 310 driven by column drivers 510…” [0056]

In regard to claim 2, wherein said driving comprises driving a plurality of said row electrodes in combination with a plurality of said column electrodes. See at least (Routley; Fig. 3 & 5) – for a driving function comprises driving a combination of a plural row and a plural column electrodes. *"…*row electrodes 306 driven by row driver circuits 512 and column electrodes 310 driven by column drivers 510…" [0056]

In regard to claim 7,wherein said first and second factor matrices are configured such that a peak pixel brightness of said display is reduced compared with a row-by-row driving of said display using said image data, Routley discloses a variable brightness is achieved by using variable substantially constant current generators. "the greatest benefits are provided by adaptively controlling the supply voltage in accordance with displayed pixel brightness… where variable brightness is achieved by driving the display using variable substantially constant current generators" [0070] Furthermore, Routley discloses a row by row driving method which will not reduce the maximum brightness of the display base on a configuration of row and column matrices (Fig. 5) "…a pixellated passive matrix display is generally only driven a row at a time although appearing to provide a uniformed display to a human observer because of the rapidity of the row refresh. Thus the supply voltage may be reduced when this will not reduce the regulated current or pixel brightness of the pixel with the highest drive voltage in a particular row being driven." [0032]

In regard to claim 19, wherein said display comprises an LCD display. Routley discloses

a LCD display "When the LCD module is in a partial display mode the line frequency may also be reduced whilst maintaining the same frame refresh rate" [0018]

In regard to claim 20, wherein said display comprises an organic light emitting diode display; Routley discloses a display can comprises a *"...*driving organic light emitting diode displays..." [0001] & "a passive matrix OLED display, such as the display 302 of FIG. 3." [0022]

In regard to claim 22, A carrier carrying a processor control code for receiving image data for display, said image data defining an image matrix; Routley discloses a "processor control code, and a carrier medium carrying the code" [0043]

factorising said image matrix into a product of at least first and second factor matrices, See at least (Routley; Fig. 2 & 5) – *for* a passive matrix displays images receive an output or a product from the rows and columns of the matrices of the pixels (Item 152). Note: a passive matrix (b x a) always compile of a (b x n) row matrix and a (n X a) column matrix (n being an integer greater than 1). "Organic LEDs may be deposited on a substrate in a matrix of pixels to form a single or multi-colour pixellated display." & "In such displays the individual elements are generally addressed by activating row (or column) lines to select the pixels, and rows or columns of pixels are written to, to create a display." [0005] Therefore, the limitation is inherent within the disclosure.

said first factor matrix defining row drive signals for said display, said second factor matrix defining column drive signals for said display; See at least (Routley; Fig. 3 & 5) – for a similar function and setup of row and column matrices defining drive commands for said display. "…a generic driver circuit for a passive matrix OLED display" & "A y - driver 314 drives the column lines 308 with a constant current and an x-driver 316 drives the row lines 304, selectively connecting the row lines to ground." [0015]

and driving said display row and column electrodes using said row and column drive signals respectively defined by said first and second factor matrices. See at least (Routley; Fig. 3 & 5) – for a similar function and setup of row and column matrices defining drive commands use by the row and column electrodes. *"…*row electrodes 306 driven by row driver circuits 512 and column electrodes 310 driven by column drivers 510…" [0056]

In regard to claim 23, A driver for an electro-optic display, See at least (Routley; Fig. 5) – "This invention generally relates to display driver circuits for electro-optic displays, and more particularly relates to circuits and methods for driving organic light emitting diode displays…" [0001]

the display having a plurality of pixels each addressable by a row electrode and a column electrode, See at least (Routley; Fig. 5) – for plurality of pixels (item 312 each are addressable by row and column electrode (item 306 and 310) "a plurality n of row

lines 304 each with a corresponding row electrode contact 306 and a plurality m of column lines 308 with a corresponding plurality of column electrode contacts 310." [0015]

the driver comprising; an input for receiving image data for display, See at least (Routley; Fig. 5) – for a driver has an control input for receiving image data "Row driver circuits 512 have a control input 511 for selecting one (or more) row electrodes for connection to ground. Column drivers 510 have a control input 509 for setting the current drive to one or more of the column electrodes." [0058]

said image data defining an image matrix; See at least (Routley; Fig. 5) – for matrix display (item 302) receives image data to be displayed. "A two-dimensional image may be presented on display 302 by selecting each row in turn and driving all the pixels…" [0058] and the matrix display (item 302) will display the image. "control inputs 509 and 511 to display this data on passive matrix display 302" [0062]

a system for factorising said image matrix into a product of at least first and second factor matrices, See at least (Routley; Fig. 2 & 5) – for a passive matrix displays images receive an output or a product from the rows and columns of the matrices of the pixels (Item 152). Note: a passive matrix (b x a) always compile of a (b x n) row matrix and a (n X a) column matrix (n being an integer greater than 1). "Organic LEDs may be deposited on a substrate in a matrix of pixels to form a single or multi-colour pixellated

display." & "In such displays the individual elements are generally addressed by activating row (or column) lines to select the pixels, and rows or columns of pixels are written to, to create a display." [0005] Therefore, the limitation is inherent within the disclosure.

said first factor matrix defining row drive signals for said display, said second factor matrix defining column drive signals for said display; See at least (Routley; Fig. 3 & 5) – for a similar function and setup of row and column matrices defining drive commands use by the row and column electrodes. *"…*row electrodes 306 driven by row driver circuits 512 and column electrodes 310 driven by column drivers 510…" [0056]

and output means to output said row and column drive signals respectively defined by said first and second factor matrices; See at least (Routley; Fig. 3 & 5) – for 2 driver outputting driving command to the electrodes. "row electrodes 306 driven by row driver circuits 512 and column electrodes 310 driven by column drivers 510." [0056] & for a passive matrix displays images receive an output or a product from the rows and columns of the matrices of the pixels (Item 152). Note: a passive matrix (b x a) always compile of a (b x n) row matrix and a (n X a) column matrix (n being an integer greater than 1). "Organic LEDs may be deposited on a substrate in a matrix of pixels to form a single or multi-colour pixellated display." & "In such displays the individual elements are generally addressed by activating row (or column) lines to select the pixels, and rows or

columns of pixels are written to, to create a display." [0005] Therefore, the limitation is inherent within the disclosure.

In regard to claim 35, A driver for an electro-optic display, See at least (Routley; Fig. 5) – "This invention generally relates to display driver circuits for electro-optic displays, and more particularly relates to circuits and methods for driving organic light emitting diode displays…" [0001]

the display having a plurality of pixels each addressable by a row electrode and a column electrode, See at least (Routley; Fig. 5) – for plurality of pixels (item 312 each are addressable by row and column electrode (item 306 and 310) "a plurality n of row lines 304 each with a corresponding row electrode contact 306 and a plurality m of column lines 308 with a corresponding plurality of column electrode contacts 310." [0015]

the driver comprising; an input to receive image data for display, See at least (Routley; Fig. 5) – for a driver has an control input for receiving image data "Row driver circuits 512 have a control input 511 for selecting one (or more) row electrodes for connection to ground. Column drivers 510 have a control input 509 for setting the current drive to one or more of the column electrodes." [0058]

said image data defining an image matrix; See at least (Routley; Fig. 5) – for matrix display (item 302) receives image data to be displayed. "A two-dimensional image may be presented on display 302 by selecting each row in turn and driving all the pixels…" [0058] and the matrix display (item 302) will display the image. "control inputs 509 and 511 to display this data on passive matrix display 302" [0062]

an output to provide data for driving said row and column electrodes of said display; See at least (Routley; Fig. 3 & 5) – for 2 driver outputting driving command to the electrodes contains data. "row electrodes 306 driven by row driver circuits 512 and column electrodes 310 driven by column drivers 510." [0056] but, fails to disclose output subframe data.

data memory to store said image data; See at least (Routley; Fig. 5) – for an image data stored in a storage means that consist of color data. "Bus 502 provides an input to a frame store or memory 504 which stores display data for each pixel of display 302, in effect forming in the memory an image of the data for display. Thus, for example, one or more bits of memory may be associated with each pixel, defining a greyscale pixel brightness level or a pixel colour." [0061]

program memory storing processor implementable instructions; See at least (Routley; Fig. 5) – for a programmed memory contains processor control code. "The invention further provides processor control code, and a carrier medium carrying the code…

…code may comprise conventional program code or microcode or code for setting up or controlling an ASIC or FPGA. The carrier may comprise a storage medium such as … programmed memory" [0043]

and a processor coupled to said input, to said output, to said data memory and to said program memory to load and implement said instructions, See at least (Routley; Fig. 5) – for a processing component that is coupled to the input and out and the memories to implement said data or instructions. "Display drive logic 506 operates in a conventional manner to read data from frame memory 504 and to provide control data signals to control inputs 509 and 511 to display this data on passive matrix display 302." [0063]

said instructions comprising instructions for controlling the processor to: input said image data; the data or instructions loaded from the memory controlled the processing component to input the data from display. "Data for display on display 302 is provided on data and control bus 502… The data in frame store 504 is stored in such a way that the brightness values of pixels in a row may be read out and, in the illustrated embodiment, frame store 504 is dual ported, outputting data read from the frame store on a second, read data bus 505." [0061]

factorise said image matrix into a product of at least first and second factor matrices, See at least (Routley; Fig. 2 & 5) – *for* a passive matrix displays images receive an output or a product from the rows and columns of the matrices of the pixels (Item 152).

Note: a passive matrix (b x a) always compile of a (b x n) row matrix and a (n X a) column matrix (n being an integer greater than 1). “Organic LEDs may be deposited on a substrate in a matrix of pixels to form a single or multi-colour pixellated display.” & “In such displays the individual elements are generally addressed by activating row (or column) lines to select the pixels, and rows or columns of pixels are written to, to create a display.” [0005] Therefore, the limitation is inherent within the disclosure.

said first factor matrix defining row drive signals for said display, said second factor matrix defining column drive signals for said display; See at least (Routley; Fig. 3 & 5) – for a similar function and setup of row and column matrices defining drive commands use by the row and column electrodes. *“…*row electrodes 306 driven by row driver circuits 512 and column electrodes 310 driven by column drivers 510…” [0056]

and output said row and column drive signals respectively defined by said first and second factor matrices. See at least (Routley; Fig. 3 & 5) – for 2 driver outputting driving command to the electrodes. *“*row electrodes 306 driven by row driver circuits 512 and column electrodes 310 driven by column drivers 510.” [0056] & for a passive matrix displays images receive an output or a product from the rows and columns of the matrices of the pixels (Item 152). Note: a passive matrix (b x a) always compile of a (b x n) row matrix and a (n X a) column matrix (n being an integer greater than 1). “Organic LEDs may be deposited on a substrate in a matrix of pixels to form a single or multi-colour pixellated display.” & “In such displays the individual elements are generally

addressed by activating row (or column) lines to select the pixels, and rows or columns of pixels are written to, to create a display." [0005] Therefore, the limitation is inherent within the disclosure.

Claim Rejections - 35 USC § 103

21. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

22. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

23. Claims 3, 6, 24 -25, 27, 31, 33, 34, & 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Routley (GBP 85906) in view of Nagaoka et al (US Pat. 5874932).

In regard to claim 3, wherein said driving comprises driving said display with successive sets of said row and column signals to build up a display image, See at least (Routley; Fig. 3 & 5) – for the driving the display with consecutive set of row and column signals send by the drivers to build up the display data or image. "…passive matrix OLED driver 500 also incorporates display drive logic 506, for providing display data to control input 509 of column drivers 510 and for providing a row select or scan control output to control input 511 of row drivers 512 for controlling the raster scanning of the display." [0062] & "…image may be presented on display 302 by selecting each row in turn and driving all the pixels in the selected row using column drivers 510" [0058]

each said set of signals defining a subframe of said display image, said subframes combining to define said display image. Routley discloses displaying an image on the display. But fails to discloses combining subframes to compose the said image. However, Nagaoka discloses "A picture of a frame is displayed on a plasma display device by combining a plurality of subframes…" (Page 1, Abstract). Since, Routley and

Nagaoka inventions are both analogous arts addressing a display system. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention to combine the display system of Routley with the subframe processing of Nagaoka to improve the brightness and the colors of a display device.

In regard to claim 6, wherein said first factor matrix has dimensions determined by a number of said row electrodes and a number of said subframes and wherein said second factor matrix has dimensions determined by a number of said column electrodes and said number of subframes.; Routley discloses displaying a passive matrix consist of a row & column matrices on Fig. 5 & 7 which dictates the dimension. Please compare the dimension of the matrix between Fig. 5 and 7 of the display; but, fails to disclose a number of subframes to the said image display. However, Nagaoka discloses "A picture of a frame is displayed on a plasma display device by combining a plurality of subframes…" (Page 1, Abstract). Furthermore, see Fig. 7a & 7b for a number of subframes. Since, Routley and Nagaoka inventions are both analogous arts addressing a display system. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention to combine the display system of Routley with the subframe processing of Nagaoka to improve the quality of the image and the output colors of a display device.

In regard to claim 24, A method of driving an electro-optic display, See at least (Routley; Fig. 5) – "This invention generally relates to display driver circuits for electro-

optic displays, and more particularly relates to circuits and methods for driving organic light emitting diode displays…" [0001]

the display having a plurality of pixels each addressable by a row electrode and a column electrode, See at least (Routley; Fig. 5) – for plurality of pixels (item 312 each are addressable by row and column electrode (item 306 and 310) "a plurality n of row lines 304 each with a corresponding row electrode contact 306 and a plurality m of column lines 308 with a corresponding plurality of column electrode contacts 310." [0015]

the method comprising: receiving image data for display; See at least (Routley; Fig. 5) – for matrix display (item 302) receives image data to be displayed. "A two-dimensional image may be presented on display 302 by selecting each row in turn and driving all the pixels…" [0058] and the matrix display (item 302) will display the image. "control inputs 509 and 511 to display this data on passive matrix display 302" [0062]

formatting said image data into a plurality of subframes, each said subframe comprising data for driving a plurality of said row electrodes simultaneously with a plurality of said column electrodes and driving said row and column electrodes with said subframe data. See at least (Routley; Fig. 3 & 5) – for the driving the display with consecutive set of row and column signals send by the drivers to build up the display data or image. "…passive matrix OLED driver 500 also incorporates display drive logic 506, for providing display

data to control input 509 of column drivers 510 and for providing a row select or scan control output to control input 511 of row drivers 512 for controlling the raster scanning of the display." [0062] & "…image may be presented on display 302 by selecting each row in turn and driving all the pixels in the selected row using column drivers 510" [0058] But fails to discloses combining subframes to compose the said image data. However, Nagaoka discloses "A picture of a frame is displayed on a plasma display device by combining a plurality of subframes…" (Page 1, Abstract). Since, Routley and Nagaoka inventions are both analogous arts addressing a display system. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention to combine the driving method in the display system of Routley with the subframe processing of Nagaoka to improve the brightness and the colors of a display device.

In regard to claim 25, wherein said formatting comprises compressing said image data into said plurality of subframes. Routley discloses all the limitation on claim 24, but fails to disclose the plurality of subframes are the combination from the image data. However, Nagaoka discloses "A picture of a frame is displayed on a plasma display device by combining a plurality of subframes…" (Page 1, Abstract) which is obvious that the subframe is a reduction of the frame or image data. Since, Routley and Nagaoka inventions are both analogous arts addressing a display system. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention to combine the driving method in the display system of Routley with the subframe processing of Nagaoka to improve the brightness and the colors of a display device.

In regard to claim 27, wherein said formatting is configured to generate subframe data such that data from more than one said subframe drives a said pixel of said display, whereby more than one said subframe contributes to an apparent brightness of pixels of the display. See at least (Routley; Fig. 3 & 5) – for the driving the pixels of the display with consecutive set of row and column signals send by the drivers and use the pixel to generate desire brightness. “Alternatively a row may be selected and all the columns written in parallel, that is a row selected and a current driven onto each of the column lines simultaneously, to simultaneously illuminate each pixel in a row at its desired brightness." [0008] “…passive matrix OLED driver 500 also incorporates display drive logic 506, for providing display data to control input 509 of column drivers 510 and for providing a row select or scan control output to control input 511 of row drivers 512 for controlling the raster scanning of the display.” [0062] & “…image may be presented on display 302 by selecting each row in turn and driving all the pixels in the selected row using column drivers 510” [0058] But fails to discloses subframes contributes to the brightness. However, Nagaoka discloses “A picture of a frame is displayed on a plasma display device by combining a plurality of subframes SF1 and Sfn having different degrees of brightness” (Page 1, Abstract) which affect the overall brightness of the display. Since, Routley and Nagaoka inventions are both analogous arts addressing a display system. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention to combine the display system of Routley with the subframe processing of Nagaoka to improve the brightness and the colors of a display device.

In regard to claim 31, wherein said display comprises an organic light emitting diode display; Routley discloses a display can comprises a *"...*driving organic light emitting diode displays..." [0001] & "a passive matrix OLED display, such as the display 302 of FIG. 3." [0022]

In regard to claim 33, A carrier carrying processor control code for receiving image data for display; Routley discloses a "processor control code, and a carrier medium carrying the code" [0043]
formatting said image data into a plurality of subframes, each said subframe comprising data for driving a plurality of said row electrodes simultaneously with a plurality of said column electrodes; and driving said row and column electrodes with said subframe data. See at least (Routley; Fig. 3 & 5) – for the driving the display with consecutive set of row and column signals send by the drivers to build up the display data or image. *"…*row electrodes 306 driven by row driver circuits 512 and column electrodes 310 driven by column drivers 510…" [0056] & "…passive matrix OLED driver 500 also incorporates display drive logic 506, for providing display data to control input 509 of column drivers 510 and for providing a row select or scan control output to control input 511 of row drivers 512 for controlling the raster scanning of the display." [0062] & "…image may be presented on display 302 by selecting each row in turn and driving all the pixels in the selected row using column drivers 510" [0058] But fails to discloses combining subframes to compose the said image data. However, Nagaoka discloses "A

picture of a frame is displayed on a plasma display device by combining a plurality of subframes…" (Page 1, Abstract). Since, Routley and Nagaoka inventions are both analogous arts addressing a display system. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention to combine the driving method in the display system of Routley with the subframe processing of Nagaoka to improve the brightness and the colors of a display device.

In regard to claim 34, A driver for an electro-optic display, See at least (Routley; Fig. 5) – "This invention generally relates to display driver circuits for electro-optic displays, and more particularly relates to circuits and methods for driving organic light emitting diode displays…" [0001]

the display having a plurality of pixels each addressable by a row electrode and a column electrode, See at least (Routley; Fig. 5) – for plurality of pixels (item 312 each are addressable by row and column electrode (item 306 and 310) "a plurality n of row lines 304 each with a corresponding row electrode contact 306 and a plurality m of column lines 308 with a corresponding plurality of column electrode contacts 310." [0015]

the driver comprising: an input to receive image data for display; See at least (Routley; Fig. 5) – for a driver has an control input for receiving image data "Row driver circuits 512 have a control input 511 for selecting one (or more) row electrodes for connection

to ground. Column drivers 510 have a control input 509 for setting the current drive to one or more of the column electrodes." [0058]

a system for formatting said image data into a plurality of subframes, each said subframe comprising data for driving a plurality of said row electrodes simultaneously with a plurality of said column electrodes; See at least (Routley; Fig. 3 & 5) – for the driving the display with consecutive set of row and column signals send by the drivers to build up the display data or image. "…passive matrix OLED driver 500 also incorporates display drive logic 506, for providing display data to control input 509 of column drivers 510 and for providing a row select or scan control output to control input 511 of row drivers 512 for controlling the raster scanning of the display." [0062] & "…image may be presented on display 302 by selecting each row in turn and driving all the pixels in the selected row using column drivers 510" [0058] But fails to discloses combining subframes to compose the said image data. However, Nagaoka discloses "A picture of a frame is displayed on a plasma display device by combining a plurality of subframes…" (Page 1, Abstract). Since, Routley and Nagaoka inventions are both analogous arts addressing a display system. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention to combine the driving method in the display system of Routley with the subframe processing of Nagaoka to improve the brightness and the colors of a display device.

and an output to output said subframe data for driving said row and column electrodes. See at least (Routley; Fig. 3 & 5) – for 2 driver outputting driving command to the electrodes contains data. "row electrodes 306 driven by row driver circuits 512 and column electrodes 310 driven by column drivers 510." [0056] but, fails to disclose output subframe data. However, Nagaoka discloses change of outputted subframe upon the driving in display. & The subframes (SFs) are being driving & outputted into the input of display on Fig. 9 (Item 70) "arrangement of subframes is changed depending upon the number of display cells in driving the plasma display" (col. 8 line 18 – 22) & Since, Routley and Nagaoka inventions are both analogous arts addressing a display system. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention to combine the driving method in the display system of Routley with the subframe processing of Nagaoka to improve the brightness and the colors of a display device.

In regard to claim 36, A driver for an electro-optic display, See at least (Routley; Fig. 5) – "This invention generally relates to display driver circuits for electro-optic displays, and more particularly relates to circuits and methods for driving organic light emitting diode displays…" [0001]

the display having a plurality of pixels each addressable by a row electrode and a column electrode, See at least (Routley; Fig. 5) – for plurality of pixels (item 312 each are addressable by row and column electrode (item 306 and 310) "a plurality n of row

lines 304 each with a corresponding row electrode contact 306 and a plurality m of column lines 308 with a corresponding plurality of column electrode contacts 310." [0015]

the driver comprising: an input to receive image data for display, See at least (Routley; Fig. 5) – for a driver has an control input for receiving image data "Row driver circuits 512 have a control input 511 for selecting one (or more) row electrodes for connection to ground. Column drivers 510 have a control input 509 for setting the current drive to one or more of the column electrodes." [0058]

said image data defining an image matrix; See at least (Routley; Fig. 5) – for matrix display (item 302) receives image data to be displayed. "A two-dimensional image may be presented on display 302 by selecting each row in turn and driving all the pixels…" [0058] and the matrix display (item 302) will display the image. "control inputs 509 and 511 to display this data on passive matrix display 302" [0062]

an output to provide data for driving said row and column electrodes of said display; See at least (Routley; Fig. 3 & 5) – for 2 driver outputting driving command to the electrodes contains data. "row electrodes 306 driven by row driver circuits 512 and column electrodes 310 driven by column drivers 510." [0056] but, fails to disclose output subframe data.

data memory to store said image data; See at least (Routley; Fig. 5) – for a image data stored in a storage means that consist of color data. "Bus 502 provides an input to a frame store or memory 504 which stores display data for each pixel of display 302, in effect forming in the memory an image of the data for display. Thus, for example, one or more bits of memory may be associated with each pixel, defining a greyscale pixel brightness level or a pixel colour." [0061]

program memory storing processor implement said instructions; See at least (Routley; Fig. 5) – for a programmed memory contains processor control code. "The invention further provides processor control code, and a carrier medium carrying the code… …code may comprise conventional program code or microcode or code for setting up or controlling an ASIC or FPGA. The carrier may comprise a storage medium such as … programmed memory"[0043]

and a processor coupled to said input, to said output, to said data memory and to said program memory to load and implement said instructions, See at least (Routley; Fig. 5) – for a processing component that is coupled to the input and out and the memories to implement said data or instructions. "Display drive logic 506 operates in a conventional manner to read data from frame memory 504 and to provide control data signals to control inputs 509 and 511 to display this data on passive matrix display 302." [0063]

said instructions comprising instructions for controlling the processor to: input said image data; the data or instructions loaded from the memory controlled the processing component to input the data from display. “Data for display on display 302 is provided on data and control bus 502… The data in frame store 504 is stored in such a way that the brightness values of pixels in a row may be read out and, in the illustrated embodiment, frame store 504 is dual ported, outputting data read from the frame store on a second, read data bus 505.” [0061]

format said image data into a plurality of subframes, each said subframe comprising data for driving a plurality of said row electrodes simultaneously with a plurality of said column electrodes; See at least (Routley; Fig. 3 & 5) – for the driving the display with consecutive set of row and column signals send by the drivers to build up the display data or image. “…passive matrix OLED driver 500 also incorporates display drive logic 506, for providing display data to control input 509 of column drivers 510 and for providing a row select or scan control output to control input 511 of row drivers 512 for controlling the raster scanning of the display.” [0062] & “…image may be presented on display 302 by selecting each row in turn and driving all the pixels in the selected row using column drivers 510” [0058] But fails to discloses combining subframes to compose the said image data. However, Nagaoka discloses “A picture of a frame is displayed on a plasma display device by combining a plurality of subframes…” (Page 1, Abstract). Since, Routley and Nagaoka inventions are both analogous arts addressing a display system. Therefore, it would have been obvious for one of ordinary skill in the art

at the time of invention to combine the driving method in the display system of Routley with the subframe processing of Nagaoka to improve the brightness and the colors of a display device.

and output said subframe data for driving said row and column electrodes. See at least (Routley; Fig. 3 & 5) – for 2 driver outputting driving command to the electrodes contains data. "row electrodes 306 driven by row driver circuits 512 and column electrodes 310 driven by column drivers 510." [0056] but, fails to disclose output subframe data. However, Nagaoka discloses change of outputted subframe upon the driving in display. & The subframes (SFs) are being driving & outputted into the input of display on Fig. 9 (Item 70) "arrangement of subframes is changed depending upon the number of display cells in driving the plasma display" (col. 8 line 18 – 22) & Since, Routley and Nagaoka inventions are both analogous arts addressing a display system. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention to combine the driving method in the display system of Routley with the subframe processing of Nagaoka to improve the brightness and the colors of a display device.

Claims 4 – 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Routley (GBP 85906) in view of Nagaoka et al (US Pat. 5874932) and Huang (US Pub. 2001/0045924 A1)

As to **Claim 4 - 5** Routley and Nagoka discloses all recited elements of **claim 3** from which **claim 4 - 5** depends.

In regard to claim 4, wherein a number of said subframes is no greater than the smaller of a number of said row electrodes and a number of said column electrodes. The examiner takes official notice it's well known in the art at the time of invention to make the number of subframes less than the number of row and column electrodes to make the image resolution more superior. Routley discloses a row and column electrode on fig. 5, but fails to expressively disclose the number of subframe is less than the number of electrodes. However, Huang discloses a resolution 600 x 800 by using eight subframe display operation on a matrix of electrode on Fig. 3. "Each frame-display operation is composed of eight subframe-display operations. The working period of the sustain operation in each subframe -display operation is controlled by the input voltages of the scanning electrode and the sustaining electrode." Since, Routley, Nagaoka and Huang inventions are both analogous arts addressing a display system. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention to combine the display system of Routley, the subframe processing of Nagaoka with to improve the resolution of the display in order to provide the user an enhance quality image.

In regard to claim 5, wherein said number of subframes is less than the smaller of a number of said row electrodes and a number of said column electrodes. The examiner

takes official notice it's well known in the art at the time of invention to make the number of subframes less than the number of row and column electrodes to make the image resolution more superior. Routley discloses a row and column electrode on fig. 5, but fails to expressively disclose the number of subframe is less than the number of electrodes. However, Huang discloses a resolution 600 x 800 by using eight subframe display operation on a matrix of electrode on Fig. 3. "Each frame-display operation is composed of eight subframe-display operations. The working period of the sustain operation in each subframe -display operation is controlled by the input voltages of the scanning electrode and the sustaining electrode." Since, Routley, Nagaoka and Huang inventions are both analogous arts addressing a display system. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention to combine the display system of Routley, the subframe processing of Nagaoka with to improve the resolution of the display in order to provide the user an enhance quality image.

Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Routley (GBP 85906) in view of Nagaoka et al (US Pat. 5874932) & Perry et al. (US Pat. 6832729).

As to **Claim 26** Routley and Nagaoka discloses all recited elements of **claim 25** from which **claim 26** depends.

In regard to claim 26, wherein said display comprises a multicolour display, See at least (Routley; Fig. 5) – "This invention generally relates to display driver circuits for electro-

optic displays, and more particularly relates to circuits and methods for driving organic light emitting diode displays…" [0001] &"Organic LEDs may be fabricated using either polymers or small molecules in a range of colours (or in multi-coloured displays)," [0002]

wherein said image data comprises colour image data, See at least (Routley; Fig. 5) – for a image data stored in a storage means that consist of color data. "Bus 502 provides an input to a frame store or memory 504 which stores display data for each pixel of display 302, in effect forming in the memory an image of the data for display. Thus, for example, one or more bits of memory may be associated with each pixel, defining a greyscale pixel brightness level or a pixel colour." [0061]

and wherein said compressing comprises compressing data for a green colour channel of said display less than data for at least one of a red and a blue colour channel of said display. Routley discloses multiple color pixels. "A multicoloured display may be constructed using groups of red, green, and blue emitting pixels." & "such displays the individual elements are generally addressed by activating row (or column) lines to select the pixels, and rows (or columns) of pixels are written to." [0005] & Nagaoka discloses a compressing method for the frame data by dividing them into subframes. "A picture of a frame is displayed on a plasma display device by combining a plurality of subframes…" (Page 1, Abstract); (see motivation to combine Routley & Nagaoka on claim 25) but, both fails to disclose the data for the green color channel is being compress less than data of the green and blue color channels. However, Perry et al. discloses a display

system emphasize the green color twice more than the blue or red color, due to the sensitivity of the human eye to green color. “A Bayer imaging pattern provides more green pixels than red or blue pixels, and is often used in digital imaging since it more accurately reflects the human eye perception of color...” (Col. 18 line 52 – 55) Since, Routley, Nagoka and Perry inventions are analogous arts addressing image processing to improve the quality of the image. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention to combine the multicolor display matrix system of Routley, with the compression method of Nagako with the analysis of green color in a Bayer imaging pattern of Perry to enhance the sharpness of the image, due to the use's eyes are more perceptive to green.

Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Routley (GBP 85906) in view of Nagaoka et al (US Pat. 5874932) & Pope (US Pub. 2003/0189579 A1).

As to **Claim 28** Routley and Nagaoka discloses all recited elements of **claim 24** from which **claim 28** depends.

In regard to claim 28, wherein said compressing comprises singular value decomposition (SVD); Routley discloses multiple color pixels. *“*A multicoloured display may be constructed using groups of red, green, and blue emitting pixels.” & “such displays the individual elements are generally addressed by activating row (or column)

lines to select the pixels, and rows (or columns) of pixels are written to." [0005] & Nagaoka discloses a compressing method for the frame data by dividing them into subframes. "A picture of a frame is displayed on a plasma display device by combining a plurality of subframes…" (Page 1, Abstract); (see motivation to combine Routley & Nagaoka on claim 25) but, both fails to disclose a SVD to be use in the method. However, Pope discloses multiple factor of matrices derive from a singular value decomposition [0042 – 0045] in order to achieving a desire resolution, including at least one of those matrices is a diagonal matrix. Since, Routley, Nagaoka and Pope inventions are analogous arts addressing image processing to improve the quality of the image of the display. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention to combine the display system of Routley, with the compression method of Nagaoka, with the SVD multiple factor matrices for image processing of Pope to improve on the image quality of the display in order to enhance the user's experience.

Claims 29 – 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Routley (GBP 85906) in view of Nagaoka et al (US Pat. 5874932) & Franz et al. (US Pub. 2003/0018604 A1).

As to **Claim 29 -30** Routley and Nagaoka discloses all recited elements of **claim 24** from which **claim 29 - 30** depends.

In regard to claim 29, wherein said compressing comprises non-negative matrix factorisation (NMF). Routley discloses multiple color pixels. *"*A multicoloured display may be constructed using groups of red, green, and blue emitting pixels." & "such displays the individual elements are generally addressed by activating row (or column) lines to select the pixels, and rows (or columns) of pixels are written to." [0005] & Nagaoka discloses a compressing method for the frame data by dividing them into subframes. "A picture of a frame is displayed on a plasma display device by combining a plurality of subframes…" (Page 1, Abstract); (see motivation to combine Routley & Nagaoka on claim 25) but, both fails to disclose a non-negative matrix factorization. However, Franz discloses a matrix comprising non-negative matrix factorization for a system to use less memory storage. "factoring out non-negative matrix factors T and D such that V.apprxeq.TD; and wherein T is an n.times.r term matrix, D is an r.times.m document matrix," Since, Routley and Jamali inventions are analogous arts addressing digital image signal processing to improve the quality of the image or the display. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention to combine the display matrix system of Routley, with compression method of Nagaoka with the non-negative matrix factorization of Franz to limit the consumption of storage requirement for the image data for every interaction, because this will allow the display to function much quicker.

In regard to claim 30, wherein said image data comprises an m.times.n matrix I and said

first and second factor matrices respectively comprise an m.times.p matrix W and a p.times.n matrix H where p is less than or equal to the smallest of n.times.m and where I.apprxeq.W.H. Routley discloses a passive matrix displays images receive an output or a product from the rows and columns of the matrices of the pixels (Item 152). Note: a passive matrix (b x a) always compile of a (b x n) row matrix and a (n X a) column matrix (n being an integer greater than 1). “Organic LEDs may be deposited on a substrate in a matrix of pixels to form a single or multi-colour pixellated display.” & “In such displays the individual elements are generally addressed by activating row (or column) lines to select the pixels, and rows or columns of pixels are written to, to create a display.” [0005]

Claims 8 - 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Routley (GBP 85906) in view of Pope (US Pub. 2003/0189579 A1)

In regard to claim 8, wherein said factorising comprises singular value decomposition (SVD) into three factor matrices, said first and second factor matrices and a third factor matrix, said third factor matrix being substantially diagonal, and wherein said row drive signals are defined by a combination of said first and third factor matrices and said column drive signals are defined by a combination of said second and third factor matrices. Routley discloses a passive matrix consist of a factor of row and column matrices on fig. 5 “control inputs 509 and 511 to display this data on passive matrix display 302” [0062] and the drive signals are executed base on the product of the

command of the row and column matrices. “In such displays the individual elements are generally addressed by activating row (or column) lines to select the pixels, and rows or columns of pixels are written to, to create a display.” [0005], but fails disclose a singular value decomposition has three factor matrices and the third factor matrices is substantially diagonal; however, Pope discloses multiple factor of matrices derive from a singular value decomposition [0042 – 0045] in order to achieving a desire resolution, including at least one of those matrices is a diagonal matrix. Since, Routley and Pope inventions are both analogous arts addressing image processing to improve the quality of the image of the display. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention to combine the display system of Routley, with the SVD multiple factor matrices for image processing of Pope to improve on the image quality of the display in order to enhance the user’s experience.

In regard to claim 9,further comprising selectively driving said display dependent upon diagonal values of said third factor matrix. Routley discloses the drive signals are executed base on the product of the command of the row and column matrices. “In such displays the individual elements are generally addressed by activating row (or column) lines to select the pixels, and rows or columns of pixels are written to, to create a display.” [0005] and selective driving of all the pixels “…on display 302 by selecting each row in turn and driving all the pixels in the selected row using column drivers 510,” [0058] but fails disclose a display dependent upon a diagonal values of a factor matrix; however, Pope discloses a multiple factor of matrices depended on the values of a

diagonal matrix [0042 – 0045] for image processing. Since, Routley and Pope inventions are both analogous arts addressing image processing to improve the quality of the image of the display. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention to combine the selectively driving system of Routley, with the SVD multiple factor matrices for image processing of Pope to improve on the image quality of the display in order to enhance the user's experience.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Routley (GBP 85906) in view of Pope (US Pub. 2003/0189579 A1) and Imoto et al. (US Pat. 5886755)

As to **Claim 10** Routley and Pope discloses all recited elements of **claim 8 or 9** from which **claim 10** depends.

In regard to claim 10, wherein said selective driving comprises omitting to drive said display with row and column drive signals defined by diagonal values of said third factor matrix less than a threshold value. Routley discloses the drive signals are executed base on the product of the command of the row and column matrices. "In such displays the individual elements are generally addressed by activating row (or column) lines to select the pixels, and rows or columns of pixels are written to, to create a display." [0005] and selective driving of all the pixels "…on display 302 by selecting each row in turn and driving all the pixels in the selected row using column drivers 510," [0058] but

fails disclose omitting to drive when the drive signals value is less than threshold value. However, Imoto discloses a selective driving method which will maintain its current state if the absolute value of the voltage applied to the pixel is smaller than the threshold value. “If the absolute value of the voltage applied in the selective driving period tw2, the holding period tk and the relaxation period ts is smaller than the ferroelectric threshold voltage .vertline.Ft.vertline., the antiferroelectric state of the liquid crystals is maintained as the state thereof.” (Col. 17 line 12 -17). Since, Routley, Pope and Imoto inventions are analogous arts addressing image processing to improve the quality of the image or the display. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention to combine the selectively driving system of Routley, with the diagonal value for multiple factor matrices for image processing of Pope, (See motivation to combine of Routley and Pope from Claim 8 or 9), with the comparison of voltage method of Imoto to limit the energy consume by the circuitry, because this would limit the changes of the voltage for driving the entire display, if the display equipped with a predetermine knowledge of the threshold value.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Routley (GBP 85906) in view of Pope (US Pub. 2003/0189579 A1) and Satake (US Pub. 20020075216 A1)

As to **Claim 11** Routley and Pope discloses all recited elements of **claim 8 or 9** from which **claim 10** depends.

In regard to claim 11,wherein said driving comprises driving said display with successive sets of said row and column signals to build up a display image each said set of signals defining a subframe of said display image, said subframes combining to define said display image, further comprising sorting said factor matrices such that said successive subframes are arranged to give the general appearance of a scanned display. Routley discloses drivers driving the display with row and column signals to build up data for display. “passive matrix OLED driver 500 also incorporates display drive logic 506, for providing display data to control input 509 of column drivers 510 and for providing a row select or scan control output to control input 511 of row drivers 512 for controlling the raster scanning of the display.” [0062] & Routley further discloses a build up of frames in order to form in memory an image of the display. “a frame store or memory 504 which stores display data for each pixel of display 302, in effect forming in the memory an image of the data for display.” [0061] and Pope discloses a squares convolution or sorting for the matrices [0042 - 43] for the pixels, but both Routley and Pope fail to disclose combining subframes to form an image and subframes are arrange to give the general appearance of a scanned display. However, Satake disclose a method of continuously combining subframes to form a color image and essentially the whole scanned display. “…a frame period in which three sub-frame periods are continuously combined to form a color image.” [0028] & (Fig. 2 &13). Since, Routley, Pope and Satake inventions are analogous arts addressing image processing to improve the quality of the image or the display. Therefore, it would have been obvious

for one of ordinary skill in the art at the time of invention to combine the driving system of Routley, with the square convolution or sorting of matrices for image processing of Pope, (See motivation to combine of Routley and Pope from Claim 8), with the subframe combination for a image on display of Satake to enhance the resolution of color in the pixels and to improve the image quality.

Claims 12 – 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Routley (GBP 85906) in view of Jamali (US Pat. 6678319)

In regard to claim 12 - 13, wherein said factorising comprises QR decomposition; wherein said factorising comprises LU decomposition; Routley discloses a passive matrix for the display with row and column matrices. “passive matrix OLED driver 500 also incorporates display drive logic 506, for providing display data to control input 509 of column drivers 510 and for providing a row select or scan control output to control input 511 of row drivers 512 for controlling the raster scanning of the display.” [0062] but, Routley fails to disclose factorizing or solving can be comprise of QR decomposition, LU decomposition; however, Jamali discloses QR decomposition, & LU decomposition for solving or factoring matrix “There are several ways to calculate … equation (7) known to those of ordinary skill in the art, for example, through LU decomposition, eigenvalues decomposition, SVD decomposition, QR decomposition, or other decompositions.” (Col. 7, line 50 – 56) Since, Routley and Jamali inventions are analogous arts addressing digital image signal processing to improve the quality of the

image or the display. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention to combine the display matrix system of Routley, with the digital signal processing method of Jamali to increase the responds time of the pixel and reduce noise in the display system.

Claim 14 - 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Routley (GBP 85906) in view of Franz et al. (US Pub. 2003/0018604 A1)

In regard to claim 14, *wherein said factorising comprises non-negative matrix factorisation (NMF).* Routley discloses a passive matrix for the display with row and column matrices. “passive matrix OLED driver 500 also incorporates display drive logic 506, for providing display data to control input 509 of column drivers 510 and for providing a row select or scan control output to control input 511 of row drivers 512 for controlling the raster scanning of the display.” [0062] but, Routley fails to disclose factorizing or solving can be comprise of non-negative factorization. However, Franz discloses a matrix comprising non-negative matrix factorization for a system to use less memory storage. "factoring out non-negative matrix factors T and D such that V.apprxeq.TD; and wherein T is an n.times.r term matrix, D is an r.times.m document matrix,” Since, Routley and Jamali inventions are analogous arts addressing digital image signal processing to improve the quality of the image or the display. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention to combine the display matrix system of Routley, with the non-negative matrix factorization

of Franz to limit the consumption of storage requirement for the image data for every interaction, because this will allow the display to function much quicker.

As to **Claim 15** Routley and Franz discloses all recited elements of **claim 14** from which **claim 15** depends.

In regard to claim 15,wherein said image matrix comprises an m.times.n matrix I and said first and second factor matrices respectively comprise an m.times.p matrix W and a p.times.n matrix H where p is less than or equal to the smallest of n.times.m and where I.apprxeq.W.H.

Routley discloses a passive matrix displays images receive an output or a product from the rows and columns of the matrices of the pixels (Item 152). Note: a matrix (b x a) always compile of a (b x n) row matrix and a (n X a) column matrix (n being an integer greater than 1). “Organic LEDs may be deposited on a substrate in a matrix of pixels to form a single or multi-colour pixellated display.” & “In such displays the individual elements are generally addressed by activating row (or column) lines to select the pixels, and rows or columns of pixels are written to, to create a display.” [0005]

Claims 16 - 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Routley (GBP 85906) in view of Perry et al. (US Pat. 6832729)

In regard to claim 16, wherein said display comprises a multicolour display, Routley discloses *“*A multicoloured display may be constructed using groups of red, green, and blue emitting pixels.” [0005]

each said pixel of which comprises subpixels of at least a green colour and a second colour, Routley discloses *"*A multicoloured display may be constructed using groups of red, green, and blue emitting pixels." [0005]

wherein said image data includes colour data defining green and second colour channels for driving said green and second colour subpixels, Routley discloses lines for activating or driving the color pixels. *"*A multicoloured display may be constructed using groups of red, green, and blue emitting pixels." & "such displays the individual elements are generally addressed by activating row (or column) lines to select the pixels, and rows (or columns) of pixels are written to." [0005]

and wherein said image matrix factorising includes weighting said green colour channel with a greater weight than said second colour channel such that said green channel is displayed on average more accurately than said second colour channel. Routley discloses all the limitations above but, fails to disclose a weighting between the green and another subpixel and the green color is displayed on average more accurately than another color. However, Perry et al. discloses a display system equips with Bayer image Pattern which put more emphasis in the green color then blue or red. Perry further discloses the green is more accurately display than other color due to the natural perception by the human eye. " A Bayer imaging pattern provides more green pixels than red or blue pixels, and is often used in digital imaging since it more accurately

reflects the human eye perception of color." (Col. 18 line 52 – 55) Since, Routley and Perry inventions are analogous arts addressing image processing to improve the quality of the image. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention to combine the display matrix system of Routley, with the Bayer imaging pattern of Perry to enhance the sharpness of the image, due to the use's eyes are more perceptive to green.

In regard to claim 17, further comprising scaling said colour data for said green and second colour channels by respective first and second weights prior to said factorisation, and wherein said second weight is less than said first weight. Routley discloses all the limitations on claim 16, fails to disclose a scaling or analysis between colors and the green weight more than other. However, Perry et al. discloses a display system analyses the green pixel and determines the rate of change to achieve a sharper image. "…analyses the green pixels of a rectangular window… in the center of each image frame, provided in a Bayer pattern, from the detector array to determine a rate of change value. … The higher the rate of change, the sharper the detail of the image." (Col. 18 line 48 – 57) Perry further discloses the display equipped with Bayer image Pattern, which put more emphasis in the green color then blue or red. Perry further discloses the green is more accurately display than other color due to the natural perception by the human eye. " A Bayer imaging pattern provides more green pixels than red or blue pixels, and is often used in digital imaging since it more accurately reflects the human eye perception of color." (Col. 18 line 52 – 55) Since, Routley and

Perry inventions are analogous arts addressing image processing to improve the quality of the image. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention to combine the display matrix system of Routley, with the analysis of green color in a Bayer imaging pattern of Perry to enhance the sharpness of the image, due to the use's eyes are more perceptive to green.

In regard to claim 18, wherein said second colour is red; Routley discloses other color is red "A multicoloured display may be constructed using groups of red, green, and blue emitting pixels." [0005]

and wherein each said pixel further comprises a blue subpixel; Routley discloses a blue pixel. "A multicoloured display may be constructed using groups of red, green, and blue emitting pixels." [0005]

wherein said colour data includes data for a blue colour channel; Routley discloses a multicolor image data in a display contains blue color data "A multicoloured display may be constructed using groups of red, green, and blue emitting pixels." [0005]

and wherein said factorising includes weighting said green colour channel with a greater weight than said red and blue colour channels. Routley discloses all the limitations above but, fails to disclose a weighting between the green and another subpixel and the green color is displayed on average more accurately than another color. However, Perry et al. discloses a display system equips with Bayer image Pattern which put more emphasis in the green color then blue or red. Perry further discloses the green is more accurately display than other color due to the natural perception by the

human eye. " A Bayer imaging pattern provides more green pixels than red or blue pixels, and is often used in digital imaging since it more accurately reflects the human eye perception of color." (Col. 18 line 52 – 55) Since, Routley and Perry inventions are analogous arts addressing image processing to improve the quality of the image. Therefore, it would have been obvious for one of ordinary skill in the art at the time of invention to combine the display matrix system of Routley, with the Bayer imaging pattern of Perry to enhance the sharpness of the image, due to the use's eyes are more perceptive to green.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PAKEE FANG whose telephone number is (571) 270-7219. The examiner can normally be reached on Monday-Friday 9AM-5PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patel Ramesh can be reached on (571)272-3688. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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